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A PUNCTURE RESISTANT SHRINK FILM AND BAG

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(57) Claim

1. A heat-shrinkable plastic film comprising an annealed film composed of a blend of at least 40 wt.% ethylene vinyl acetate (EVA), at least 10 wt.% of a very low density linear polyethylene (VLDLPE) resin having a density of not greater than 0.91 gm/cm^3 and 0-50 wt.% of an linear low density polyethylene (LLDPE) having a density above 0.91 gm/cm^3.

9. A heat-shrinkable plastic film as in claim 1 wherein said film is an irradiated film.

11. A multilayered heat-shrinkable plastic film comprising:

a) first and third outer layers each being a blend of at least 40 wt.% ethylene vinyl acetate (EVA). at least 10 wt.% very low density linear polyethylene (VLDLPE) and 0-50 wt.% linear low density polyethylene (LLDPE);

b) a core layer of ethylene vinyl acetate between and bonded on opposite sides to said first and third layers respectively; and

c) said film being an annealed film having a free shrink of at least about 20% in the transverse direction.

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19. A shrink bag for packaging meat comprising side walls composed of a heat-shrinkable plastic film and a guard patch film adhered to the exterior surface of at least one of said sidewalls wherein said guard patch film is an annealed and irradiated heat-shrinkable plastic film composed of a resin blend of at least 40 wt.% EVA, at least 10 wt.% VLDLPE and 0-50 wt.% LLDPE.

Form 10

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COMPLETE SPECIFICATION

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Complete Specification for the invention entitled:

A PUNCTURE RESISTANT SHRINK FILM AND BAG

The following statement is a full description of this invention, including the best method of performing it known to :- US

A PUNCTURE RESISTANT SHRINK FILM AND BAG

Technical Field:

The present invention relates to an annealed heat-shrinkable film of ethylene copolymers having improved puncture resistance and to a vacuum packaging bag having a reinforced section made from said film.

Description Of The Prior Art:

It is customary to package primal cuts of meat such as rib sections or the like into heat-sealable plastic bags which are evacuated and heat shrunk to draw the bag tightly about the cut of meat. Preferably, the bag is made from a thermoplastic film having good oxygen-barrier properties to retard spoilage and discoloration of the meat. Typically, such primal cuts of meat have protruding bones which may puncture the bag as the bag material is drawn tightly about the cut of meat during the evacuation and heat shrinking process. Since the benefits of such packaging are lost if the bag is punctured, various efforts have been directed to preventing such a breech. For example, U. S.

Patent No. 3,653,927 discloses draping a cloth or other reinforcing layer over the bony protusions of the meat prior to packaging. However, this is labor intensive and the reinforcing layer may shift and remove from the bone during packaging, thereby rendering the layer ineffective to prevent puncturing of the package.

U. S. Patent No. 3,741,253 discloses a laminated film wherein the various layers incorporate all the properties of shrinkability, puncture resistance, heat sealability, and oxygen barrier in a single film structure. However, attempts to build all the desirable features into a laminated film drastically increase the cost of the film and of the bags made therefrom.

U. S. Patent No. 4,239,111 discloses a bag which is provided with a reinforcing patch at only those areas of the bag most susceptible to puncture. The so called "guard patch" as disclosed in the '111 Patent is composed of stretch-oriented polyethylene sheets which are bonded to the exterior surface of the bag by a suitable synthetic rubber-based pressure sensitive adhesive.

Objects of the Invention:

One object of the present invention to provide a novel heat-shrinkable film having enhanced puncture resistance characteristics.

Another object of the invention is to provide a novel heat-shrinkable and puncture resistant film having layers composed of a blend of

ethylene vinyl acetate and very low density linear polyethylene polymers.

A further object of the invention is to provide a novel heat-shrinkable puncture resistant film for reinforcing the wall of a vacuum packaging bag.

Summary Of The Disclosure:

The present invention is an annealed multilayer film suitable for use as a guard patch. In particular, the improved film of the present invention is a laminated film including layers composed of a blend of ethylene vinyl acetate (EVA) and very low density linear polyethylene polymers.

Very low density linear polyethylene (VLDLPE) as used herein is a copolymer of ethylene and other alpha olefins having a density below about 0.91 gms per cubic centimeter. This is below the density range of conventional linear low density polyethylenes (LLDPE) which are commonly recognized as having densities in the range of above about 0.91 to about 0.93 gms per cubic centimeter.

It generally is considered not desirable to anneal a film that is to be used in a heat shrink packaging operation. This is because annealing is known to reduce the free shrink of the film. Free shrink as used herein refers to the percent of length reduction, in both the machine direction and the transverse direction, produced by heating the film. However, it has been discovered that the annealed films of the present invention exhibit an

improved puncture resistance while retaining an acceptable level of free shrink.

More specifically the present invention in its broadest aspect is characterized by a heat-shrinkable plastic film comprising an annealed film composed of a blend of at least 40 wt.% EVA, at least 10 wt.% of a VLDLPE having a density not greater than about 0.91 gm/cm^3 and 0-50 wt.% of a LLDPE having a density above about 0.91 gm/cm^3.

In another aspect, the present invention comprises a multilayered heat-shrinkable plastic film comprising:

a) first and third outer layers each being a blend of at least 40 wt.% ethylene vinyl acetate, at least 10 wt.% very low density linear polyethylene and 0-50 wt % linear low density polyethylene;

b) a core layer of ethylene vinyl acetate between and bonded on opposite sides to said first and third layers; and

c) said film being an annealed film with a shrinkage of at least 20% in its transverse direction.

It has been unexpectedly discovered that the puncture resistance of a shrinkable film made from a blend of VLDLPE and EVA resins is greatly increased by annealing without significant loss of free shrink. The desirable characteristics of shrinkability and enhanced puncture resistance are found, in particular, in a biaxially oriented multilayer film including a core layer of EVA bonded on opposite sides to outer layers comprising an EVA

and VLDLPE blend or a blend of EVA, VLDLPE and linear low density polyethylene (LLDPE).

EVA resins useful in the invention as the core layer or as part of the blend of resins for the outer layers, should contain 10-20 wt.% vinyl acetate (VA). A lower VA content produces a lower initial shrink for the film whereas a higher VA content may produce excessive shrinkage.

A VA content of about 15 wt.% is preferred for the resin of the core layer and a VA content of about 12 wt.% is preferred for the EVA resin component of each outer layer.

The blend of resins for use in the outer layers of the film should contain at least about 40 wt.% EVA. Blends having less than 40 wt.% EVA tend to exhibit a lower absolute puncture strength than do blends having more than 40 wt.% EVA.

VLDLPE for use in the outer layers of the film has a density below about 0.91 gm/cm^3 and a melt index (by ASTMD-1238, Procedure A, Condition E) in the range of 0.8 to 1.2. In particular, at least about 10 wt.% VLDLPE should be used in the blend. It was found that blending at least 10 wt.% VLDLPE with EVA produces a film which has a surprising and dramatic increase in puncture resistance upon annealing and which retains sufficient shrink properties to permit use of the film in shrink packaging applications.

A 50-50 blend of EVA and VLDLPE has been found to be particularly useful. However, it also is possible to include a linear low density polyethylene (LLDPE) in the blend so long as the

lower limits of about 40 wt.% EVA and about 10 wt.% VLDLPE are maintained. A typical LLDPE useful in the invention is a hexene copolymer with a density of about 0.916 to 0.918 and a melt index in the range of about 1.0 to about 2.6.

The manufacture of a biaxially oriented heat-shrinkable film by extrusion or coextrusion of thermoplastic resins by "blown bubble" technology is well known in the art. For example, reference is made to U. S.Patent No. 4,514,465, the disclosure of which is incorporated herein by reference, for a discussion of the various extrusion processes and the subsequent operations which may be performed on the film, such as, for example, irradiating the film to achieve cross-linking. Accordingly, it is well within the skill of the art to use these known film manufacturing methods to make the film of the present invention which comprises a blend of EVA/VLDLPE resin or a blend of EVA/VLDLPE/LLDPE resins and, in particular, which comprises such a resin blend as the outer layers disposed on each side of a core layer of EVA.

The multilayered film of the present invention undergoes an annealing process which involves heating the film to reduce its free shrink. Heating can be accomplished with any suitable means, such as by a hot water bath, infrared heaters or by passing of the film through a heated air stream. The annealing process surprisingly and dramatically increases the puncture resistance of the film without significantly reducing the free shrink of the film.

In annealing the film, care should be taken to retain, in the annealed film, sufficient residual or free shrink to permit its use for shrink wrap applications. Generally, a free shrink of not less than about 20% is desirable for a shrink wrap film. When used as a guard patch, the free shrink of the patch film should be close to the free shrink of the bag so that the absolute difference between the free shrink of the two films (i.e., bag film and guard patch film) is as low as possible. This will minimize the risk that the patch will separate from the bag when the bag is heated to shrink the bag about the enclosed product. Preferably, the free shrinkage of the patch film should be within about 25% of the free shrink of the bag film. For example, if the bag film has a free shrink of 45% the patch film should have a free shrink of at least 20%.

Description Of The Figures:

Figure 1 is a cross-sectional view of a multilayered film showing a preferred six-layered embodiment of the present invention; and

Figure 2 is a view showing the film of the present invention utilized as a guard patch material on a shrink bag.

Detailed Description Of The Invention:

Referring to the drawings, Figure 1 shows, in cross section, the shrink film of the present

invention generally indicated at 10. The film has six layers including core or inner layers 12 composed of ethylene vinyl acetate (EVA) and outer layers 14 each composed of a mixture of EVA and very low density linear polyethylene (VLDLPE).

The heat-shrinkable film of the invention can be produced by known techniques such as by coextruding the layers into a primary tube followed by orienting the tube. The "double bubble" technique disclosed in U. S. Patent No. 3,456,044 can be used to produce the film of the invention.

It should be appreciated that coextrusion will initially produce a tube of film having its wall comprising an inner layer composed of the EVA resin and concentric outer layers composed of the EVA/VLDLPE blend. In the "double bubble" technique the oriented tube is collapsed so that the tube wall of three layers becomes a film having the preferred six-layered structure shown in Figure 1. However, for purposes of simplifying the description of the invention, the two EVA core layers will be considered as a single layer 12 serving to bond together the two outer layers 14. Likewise, each of the double outer layers of the EVA/VLDLPE blend will be considered as single first and third outer layers 14.

Core layer 12 is an ethylene vinyl acetate copolymer having from 10 to 20 wt.%, and preferably about 11-15 wt.%, of vinyl acetate. Each outer layer 14 is composed of a blend of resins including an ethylene vinyl acetate and a very low density linear polyethylene. The EVA component of each

outer layer preferably contains about 12 wt.% vinyl acetate. A suitable ethylene vinyl acetate copolymer has a melt index of about 0.25, a melting point of about 96°C and a density of about 0.933 gm/cm^3.

The VLDLPE component of the blend of each outer layer preferably is an ethylene-alpha olefin copolymer. A suitable VLDLPE resin has a melt index of about 1.0, and a melting point of about 120°C and a density of about 0.906 gm/cm^3.

Preferably, each outer layer 14 comprises a 50-50 blend of EVA and VLDLPE. However, it is possible to have these outer layers composed of a blend of three resins, EVA/VLDLPE/LLDPE. For purposes of blending with EVA and VLDLPE, a suitable LLDPE is an ethylene-hexene copolymer having a melting point of about 120°C, a melt index of about 1.0 and a density of about 0.918 gms/cm^3.

The film 10 of the present invention will normally have a total thickness of from about 3 to 9 mils wherein the ratio of the thickness of the inner core layer 12 to the total thickness of the two outer layers 14 is about 10 to 90. For example, in a film of about 5 mils, the inner or core layer 12 is about 0.5 mils thick and each of the outer layers is about 2.25 mils thick.

After the film is manufactured by coextruding the three layers into a primary tube followed by orienting the tube according to the aforesaid "double bubble" technique, the film is annealed. In a prefered annealing process, the film passes through a hot air stream and is wound

directly onto a take-up reel. This shrinks the oriented film in both its machine and transverse directions.

It has been unexpectedly discovered that annealing improves the puncture resistance of the film of the present invention without significant loss of free shrink. However, where the film is used as a guard patch for a conventional heat-shrink bag, it is important to control the annealing process so as to limit the amount of shrinkage. In this respect, annealing reduces the free shrink of the film. If the difference between the free shrink of the guard patch film and the bag film is too great, wrinkles are created in the guard patch when the bag is shrunk around the meat article. In an extreme case, the guard patch can disassociate from the bag. Accordingly, the annealing should be sufficient to increase the puncture resistance of the patch material while minimizing the effect on free shrink. Preferably, the annealing is controlled so the annealed film retains a free shrink of about 20-40% as measured in the transverse direction. Also, the absolute difference between the free shrink of the guard patch film and the bag film should remain at a low level. Preferably, the free shrink of the annealed guard patch film is within 25% of the free shrink of the bag film as set out hereinabove.

To demonstrate the invention, a number of resin blends were prepared, extruded and biaxially oriented using the "double bubble" technique. Each of the resulting films contained an inner or core

layer 12 composed of an EVA resin. The outer layers 14 of each film were blends of EVA resin and either a VLDLPE or a VLDLPE/LLDPE mixture. As a control, films were made wherein the outer layers were composed of the same EVA resin blended with various LLDPE (density above 0.91 gm/cm^3) resins without any VLDLPE. The ratio of outer layer to inner or core layer thickness for each film was about 90:10.

After the films were made, they were annealed by passing them at a rate of about 60 feet/min. through a hot air stream at about 65°C. The free shrink of each film was determined before and after annealing by immersing measured specimens of the film in a constant temperature water bath controlled to 90°C and measuring the length of the specimen after five seconds immersion. Dynamic puncture resistance of each film was tested both before and after annealing.

The dynamic puncture resistance was tested using a Dynamic Ball Burst Tester, Model No. 13-8 available from Testing Machines, Inc., Amityville, New York. The tester probe arm of the machine is provided with a 3/8 inch diameter metal probe sharpened to simulate a sharp bone end. In the test the probe arm is impacted against the sample of film and the energy required to puncture the film is recorded.

The results of the dynamic puncture tests calculated in cm-kg per mil of film thickness, and the results of the shrinkage tests for both the machine (M) and transverse (T) directions are set out in Table I.

Table I

Example	Core Layer Resin	Outer Layer Resin	Ratio Weight Basis	Average Dynamic Puncture Per Mil Before	After	Percent Improvement Per Mil	Shrink At 90°C M/T Before	After
A	EVA-2	EVA-1 LLDPE-1	50 50	1.5	1.5	0	30/35	12/19
B	EVA-2	EVA-1 LLDPE-2	50 50	1.4	1.4	0	30/34	22/27
C	EVA-2	EVA-1 LLDPE-3	50 50	1.2	1.4	16	30/35	14/20
D	EVA-2	EVA-1 LLDPE-4	50 50	1.1	1.3	18	24/30	17/23
E	EVA-2	EVA-1 LLDPE-5	40 60	1.2	2.0	67	28/32	5/11
F	EVA-2	EVA-1 VLDLPE	50 50	1.5	2.6	73	42/48	35/40
G	EVA-2	EVA-1 LLDPE-2 VLDLPE	40 40 20	1.3	2.2	69	25/35	12/19
H	EVA-3	EVA-1 LLDPE-2 VLDLPE	40 50 10	Not Taken	2.8	--	Not Taken	25/26
I	EVA-2	EVA-1 LLDPE-2 VLDLPE	35 35 30	1.3	1.7	31	23/32	14/21

The resins used in the film samples of Table I are more particularly described in Table II.

Table II

Resin	Melt Index	Density	Copolymer
LLDPE-1	2.3	0.917	Octene
LLDPE-2	1.0	0.918	Hexene
LLDPE-3	0.65	0.918	Hexene
LLDPE-4	2.6	0.916	Hexene
LLDPE-5	2.4	0.921	Hexene
VLDLPE	1.0	0.906	Butene
EVA-1	0.25	0.934	12% VA
EVA-2	0.25	0.933	11% VA
EVA-3	0.25	0.935	15% VA

Examples A-D are controls composed of a 50/50 blend of EVA and LLDPE resins. The improvement in dynamic puncture resistance of these films, after annealing, is zero (0) percent for Examples A and B, only 16% for Example C and 18% for Example D. Example E, which is a 40/60 blend of EVA and LLDPE exhibits a greater increase in post annealing puncture resistance (67%) but its free shrink, after annealing, is the lowest of any of the films tested and is considered too low to be used as a shrink film.

The film of Example F represents an embodiment of the present invention in that the outer layers of the film are composed of a 50/50 blend of EVA and VLDLPE resins. After annealing, this film exhibits a surprising and dramatic 73% increase in puncture resistance. Moreover, there is only a slight reduction in free shrink in that after annealing, the film still retains over 80% of its pre annealing free shrink.

The films of Examples G and H are further embodiments of the invention. In these examples the outer layers of the film are composed of blends of EVA, VLDLPE and LLDPE. A portion of the VLDLPE was replaced by LLDPE in order to reduce the costs of the film and to determine a lower limit for the amount of VLDLPE. These examples demonstrate that amounts of VLDLPE in the blend as low as 10 wt.% in a three component blend of EVA/LLDPE/VLDLPE will function to improve dynamic puncture resistance after annealing. In these films, the dynamic puncture resistance was greater than any of the

controls (Examples A-E) which did not contain VLDLPE. Moreover, while the post annealing free shrink of Examples G and H was less than the 50/50 blend of Example F, it nevertheless was comparable to, or greater than, the free shrink of the controls.

In the film of Example I, the amount of EVA in each outer layer of the film was reduced to 35 wt.% of the three component blend of EVA/LLDPE/VLDLPE. This film exhibited the lowest increase in dynamic puncture resistance despite its 30 wt.% VLDLPE content and indicates that at least about 40 wt.% EVA is needed in an EVA/VLDLPE blend in order to have an improved dynamic puncture resistance after annealing.

The films of Examples F and G after annealing, were irradiated to provide additional impact strength. For example, after irradiation to about 10 Mrad, the puncture resistance per mil of film thickness of the film of Example F increased from 2.6 to 2.8 gms/cm^3 and that of the film of Example G increased from 2.2 to 2.5 gms/cm^3.

These irradiated films were then coated on one side to permit use of the film as a guard patch on a conventional shrink bag (Figure 2). The adhesive is conventional. It can be any water or solvent based pressure sensitive adhesive or a hot melt adhesive having the properties of water and heat resistance and sufficient shear strength to resist its disassociation from the bag during the shrinking process.

Referring to Figure 2, a conventional shrink bag shown at 18 is made of a three layer

film. For example, a suitable bag film disclosed in Canadian Patent No. 982,923 is a heat-shrinkable three layer film having a core layer of a vinylidene chloride copolymer and outer layers composed of ethylene/vinyl acetate copolymer. As described in the aforesaid Canadian Patent, this film will have a free shrink of about 35% in the machine direction and about 42% in the transverse direction when immersed in a constant temperature water bath at about 90°C for five seconds.

As shown in Figure 2, the irradiated film of the present invention is adhered to the exterior of the bag to provide a guard patch 20. One or more of the guard patches are located over areas of the bag most suseptable to bone puncture.

In a comparative test, 24 beef ribs were packaged into conventional 18 x 28 in. plastic shrink bags without guard patches. Instead, a reinforcing layer of tobacco cloth was draped over the ribs in a conventional manner prior to packaging. A like number of beef ribs were packaged in like bags having a guard patch 15 3/4 x 20 3/4 in. made of a film of the present invention. The guard patch was made of the annealed film of Example G and it was adhered to the outer surface of the bag by a pressure sensitive water based latex adhesive (Northwest Coatings Corporation No. 707). The bags were evacuated, sealed and heat shrunk using conventional packaging equipment. Thereafter, the bags were placed on shaker tables and vibrated at about 3cps for 2 hours. The results of the test indicated that the effect of the guard patch in

eliminating damage from abrasion and bone puncture was comparable to the bags using the reinforcing layer of tobacco cloth.

While the film of the present invention has been described as a film composed of six layers, the double layers of the EVA core 12 and the outer layers 14 can be made as single layers so as to provide a three layered film.

As set out hereinabove, core layer 12 serves to bind the outer layers and for this reason the core layer is relatively thin as compared to the thickness of the outer layers 14. Moreover, it also is possible to eliminate the core layer if only a single film layer is desired. In this respect, a single layer is provided by extruding a primary tube whose wall is a single layer composed of a resin blend containing VLDLPE. After orientation, the tube is slit rather than collapsed to produce the single layer film. Single layers of this film can then be laminated together or to other films as desired by any suitable adhesive or bonding agent to provide a multilayer film. Thus it should be appreciated that the film of the present invention can be a single layer film comprising a blend of EVA and VLDLPE, which film is annealed to provide enhanced dynamic puncture resistant properties.

In general, various conventional additives such as slip agents, anti-blocking agents and pigments can be incorporated in the films in accordance with conventional practice.

Having thus described the invention in detail what is claimed as new is:

XXXXXXXXX

THE CLAIMS DEFINING THE INVENTION ARE AS FOLLOWS:

1. A heat-shrinkable plastic film comprising an annealed film composed of a blend of at least 40 wt.% ethylene vinyl acetate (EVA), at least 10 wt.% of a very low density linear polyethylene (VLDLPE) resin having a density of not greater than 0.91 gm/cm^3 and 0-50 wt.% of an linear low density polyethylene (LLDPE) having a density above 0.91 gm/cm^3.

2. A heat-shrinkable plastic film as in claim 1 wherein said annealed film has a free shrink of at least 20% in the transverse direction.

3. A heat-shrinkable plastic film as in claim 1 comprising a 50/50 weight basis blend of said EVA and said VLDLPE.

4. A heat-shrinkable plastic film as in claim 1 including at least 40 wt.% of said LLDPE.

5. A heat-shrinkable plastic film as in claim 1 having three layers including a core layer composed of EVA and outer layers composed of said resin blend bonded to opposite sides of said core layer.

6. A heat-shrinkable plastic film as in claim 5 wherein the thickness of said outer layer to the thickness of said core layer is in the ratio of about 90:10.

7. A heat-shrinkable plastic film as in claim 5 wherein said EVA of both said blend and said core layer contains 10-20 wt.% vinyl acetate.

8. A heat-shrinkable plastic film as in claim 7 wherein said EVA of said core layer contains about 15 wt.% vinyl acetate and said EVA of said blend contains about 12 wt.% vinyl acetate.

9. A heat-shrinkable plastic film as in claim 1 wherein said film is an irradiated film.

10. A heat-shrinkable plastic film as in claim 1 comprising 40 wt.% of an EVA resin containing 12 wt.% vinyl acetate, 20 wt.% of said VLDLPE resin and 40 wt.% of said LLDPE resin.

11. A multilayered heat-shrinkable plastic film comprising:

a) first and third outer layers each being a blend of at least 40 wt.% ethylene vinyl acetate (EVA), at least 10 wt.% very low density linear polyethylene (VLDLPE) and 0-50 wt.% linear low density polyethylene (LLDPE);

b) a core layer of ethylene vinyl acetate between and bonded on opposite sides to said first and third layers respectively; and

c) said film being an annealed film having a free shrink of at least about 20% in the transverse direction.

12. A heat-shrinkable plastic film as in claim 11 wherein each of said first and third outer layers is a 50/50 weight basis blend of EVA and VLDLPE.

13. A heat-shrinkable plastic film as in claim 11 wherein the EVA resin in each of said core and outer layers contains about 10-20 wt.% vinyl acetate.

14. A heat-shrinkable plastic film as in claim 13 wherein said EVA resin of said core layer contains about 15 wt.% vinyl acetate and said EVA in said outer layers contains about 12 wt.% vinyl acetate.

15. A heat-shrinkable plastic film as in claim 11 wherein said VLDLPE has a density below 0.91 gm/cm^3 and a melt index of about 0.8 to about 1.2.

16. A heat-shrinkable plastic film as in claim 11 wherein said LLDPE has a density of at least 0.91 gm/cm^3 and a melt index in the range of about 1.0 to about 2.6.

17. A heat-shrinkable plastic film as in claim 11 wherein said outer layers are each a blend of resins comprising 40 wt.% EVA, 50 wt.% LLDPE and 10 wt.% VLDLPE.

18. A heat-shrinkable plastic film as in claim 11 having six layers wherein:

a) said core layer of EVA comprises a double EVA layer bonded one to another; and

b) said first and third outer layers each comprises a double layer of said EVA/VLDLPE/LLDPE blend.

19. A shrink bag for packaging meat comprising side walls composed of a heat-shrinkable plastic film and a guard patch film adhered to the exterior surface of at least one of said sidewalls wherein said guard patch film is an annealed and irradiated heat-shrinkable plastic film composed of a resin blend of at least 40 wt.% EVA, at least 10 wt.% VLDLPE and 0-50 wt.% LLDPE.

20. A shrink bag as in claim 19 wherein said guard patch film is a multilayered heat-shrinkable plastic film having a core layer of EVA and outer layers composed of said blend, said outer layers being bonded to opposite sides of said core layer.

DATED this 2nd day of February 1988.

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FIG 1

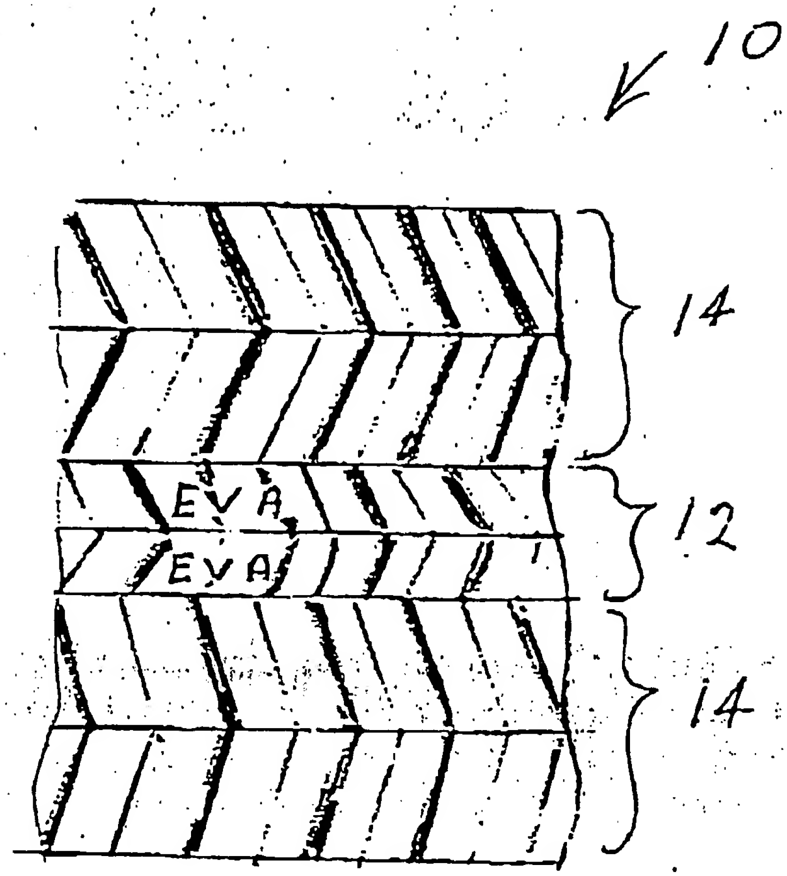

FIG 2